It is desirable that the calculations made by any one of the bureaux should be communicated to other bureaux, which have to use them at least three years in advance.

The above conventions will be put in force in such a way as to be complete in 1917.

It is understood that the above arrangements are provisional, subject to approval by the Governments concerned.

THE SOLAR PHYSICS OBSERVATORY.

WE take the following from Wednesday's *Times* (November 29):—

> At the Congregation on Thursday, December 7, the following Graces will be offered to the Senate:—"That the recommendations contained in the report, dated November 13, 1911, of the Council of the Senate on the proposed transference of the Solar Physics Observatory to Cambridge—namely, (1) that the University accept the charge of the Solar Physics Observatory, subject to the conditions laid down in the letter from the President of the Board of Education; (2) that steps be taken to obtain the powers requisite for the suspension of the election to the Plumian professorship of astronomy and experimental philosophy when it next becomes vacant, for a time sufficient to enable the University, if necessary, to obtain changes in the statutes which define the title of the professorship and the duties of the professor—be approved."
>
> The proposal to transfer the Solar Physics Observatory to Cambridge was discussed in the Senate last Thursday. The proposal was warmly welcomed by Prof. Newall, Prof. Sir George Darwin, Prof. Sir Robert Ball, and Dr. Glaisher. The arrangements for organising the work of the department and for the provision of the necessary site were fully explained.

Nothing seems to have been said about the financial arrangements necessary to secure permanence. In the report of the so-called Departmental Committee the following passage occurs:—

> With a view to securing the permanence of any arrangement that may now be made, the committee desire to point out the importance of attaching the directorship of the Solar Observatory, if established at Cambridge, to a professorship which is not merely of a temporary character. The University may not be in a position, at present, to give any definite assurance that the professorship will be renewed at the expiration of the present tenure; but we consider it highly desirable that the Government should ascertain, before coming to a final decision, whether the University is willing at an early opportunity to consider favourably the establishment of a professorship of astrophysics on a permanent foundation.

The "permanence" contemplated by the Council of the Senate only becomes operative on the death or resignation of the present Plumian professor. It is taken for granted that the unpaid professorship of astrophysics will not be vacated for any cause in the interval. What is to happen during a vacancy is not stated. Is this the kind of "permanence" contemplated by the Government? Is the next vacation of the Plumian professorship, which everybody hopes will not occur for many years, the "early opportunity" referred to in the report of the committee?

NOTES.

FOLLOWING on the announcement last week of the appointment of an expert committee of investigation into the etiology, &c., of foot-and-mouth disease comes the interesting and, if it should be confirmed, important announcement of the discovery of the causal organism of this serious animal scourge. This claim has been put forward by a German bacteriologist, Dr. Siegel, in a paper read at the annual Congress of Prussian Veterinary Surgeons in Berlin. Dr. Siegel claims to have found the organism in the blood stream and in the local lesions in affected animals, to have cultivated it in artificial media, and that in experimenting with his organism it has satisfied the postulates of Koch. Moreover, he claims to be able to produce some degree of immunity to the disease. Details of this interesting paper are not yet to hand; and in the meantime the claim must be accepted with the reserve which must obviously be accorded to the statement of the discovery of an organism that has up to the present eluded vigorous and systematic research by other experts of almost all nationalities. In the meantime, the full details of experiments will be anxiously awaited; and if they warrant it, it will be one of the first duties of the British expert committee to investigate them carefully, and either to confirm or refute the claims of Dr. Siegel. Should the discovery be confirmed, it will indeed be an enormous boon to the whole agricultural world.

THE Bradshaw lecture is to be delivered at the Royal College of Surgeons on December 6 by Mr. R. Clement Lucas, who has chosen for his subject "Some Points in Heredity."

THE Paris correspondent of *The Times* reports that Prince Roland Bonaparte has placed at the disposal of the French Academy of Sciences a sum of 10,000*l*., which is to serve as a fund in aid of those of its members who are engaged in research work.

THE superintendent of the Indian Museum informs us that Mr. J. Coggin Brown, curator of the museum of the Geological Survey of India, accompanies the Abor expedition as geologist The botanical work is in the hands of Mr. I. H. Burkill, reporter on economic products to the Government of India, while Mr. Stanley Kemp, assistant superintendent in the Indian Museum, is in charge of both zoology and anthropology, with Mr. R. Hodgart as taxidermist and assistant.

THE ringing of birds in order to study their movements has been referred to frequently in these columns. About twenty thousand birds have been ringed by correspondents of *British Birds*, the rings bearing the name of the editor of that journal, Mr. Witherby. One of these birds, a sea snipe, or redshank, was shot recently at Wesport, County Mayo, and it was assumed to be a bird escaped from captivity in London. A report in *The Times* of November 29 says:—"The incident has caused much local interest, since nobody in Connaught has ever heard of a tame redshank. It has among seabirds the reputation of being remarkably shy." Local opinion in Connaught as to the difficulty of taming a redshank need not be disturbed. The bird referred to was probably ringed by one of Mr. Witherby's correspondents far away from London, and it is unlikely that it was ever in a cage.

LIEUT.-COLONEL EDGAR A. MEARNS, U.S.A., retired, associate zoologist of the United States National Museum, who accompanied the Smithsonian Expedition to Africa, under the direction of Colonel Theo. Roosevelt, will be attached as naturalist to the Childs Frick Abyssinian Expedition, which will sail from London shortly to make natural history collections in the Abyssinian region. It is proposed to make as complete a collection of the animals of the Abyssinian region as possible. The journey will be primarily through Abyssinia, but will extend into British East Africa as well, and cover a portion of that country north of the field gone over by Colonel Roosevelt in 1909–10. One of the most important regions to be visited is in the neighbourhood of Lake Rudolf, and along the shores of the lake itself. It is expected that the operations of the expedition will cover a period of approximately seven months. There is no question that, even with moderate success, the United States national collections will be enriched by valuable specimens.

THE annual Huxley memorial lecture in connection with the Royal Anthropological Institute was delivered by Prof. F. von Luschan on November 23. Prof. von Luschan in his address said that to study the old ethnic elements of Western Asia it seemed best first to eliminate the more recent immigrations of Albanians, Circassians, Bulgarians, Franks, and Levantines. It is easy also to eliminate the different nomadic tribes, of which the Kurds are of special importance, being originally xanthochroic, with light hair and light eyes, whilst in all the other groups dark complexion is far predominant. The final result of anthropometric investigations—about 5000 men were measured—is that all Western Asia was originally inhabited by a homogeneous melanochroic race with extremely short and high heads, and with a "Hittite" nose. About 4000 B.C. began a Semitic invasion from the south-east, probably from Arabia, and by people looking like modern Bedouins. Two thousand years later begins a second invasion, this time from the north-west, and by xanthochroous, long-headed tribes, like the modern Kurds, perhaps half savage, and in some way or other connected with the historic Harri, Amorites, and Tamehu. The modern Turks, Greeks, and Jews are all three equally built up upon these three elements—the Hittite, the Semitic, and the xanthochroous Nordic. Quite differently is it with the Armenians and the Persians, who, and still more the Druses, the Maronites, and the smaller sectarian groups of Syria and Asia Minor, represent the old Hittite element, and are little or not at all influenced by the somatic character of alien invaders.

AN extra meeting of the Chemical Society was held at Burlington House on Thursday last, November 23, when Prof. Harold B. Dixon, F.R.S., past-president, delivered a memorial lecture in honour of Pierre Eugène Marcelin Berthelot. Prof. Dixon dealt fully with the life and character of Berthelot, referring to his persistence, his feverish energy, and devotion to his work. Berthelot, a native of Paris, was born on October 25, 1827, in a flat overlooking the Rue du Mouton. From this flat he must often have been a spectator of many violent scenes enacted during the revolutions of 1830 and 1848. He was educated at the Lycée Henri IV, and in 1861 was promoted to the chair of organic chemistry at the Collège de France, a position he held until his death. Reference was made to the intimate and enduring friendship between Berthelot and Renan, to Berthelot's romantic marriage with Madame Breguet, and to the great happiness of their married life. Berthelot was in Paris in 1870 during the Siege of Paris, and gave considerable assistance to his country in the manufacture of explosives. Madame Berthelot, with her children, had to leave her husband, going first to Rouen and thence to London. In addition to his professorial duties, Berthelot took his share in the government of his country. In 1881 he was elected a Senator, and five years later became the Minister of Education. In 1895 he held for a short time the position of Foreign Minister in the Bourgeois Cabinet. From 1863 onwards honour upon honour was bestowed upon him. He became a foreign member of numerous scientific societies, including the Royal and the Chemical Societies; and in 1900 he was elected one of the forty of the Académie Française. A year later, on November 24, 1901, the savants from the universities and societies all over the world met at the Sorbonne, in Paris, to celebrate the seventy-fifth anniversary of his birthday, the President of the French Republic (M. Loubet) presiding. In 1907 came the dramatic end to his illustrious career, he and Madame Berthelot dying together on March 18. Prof. Dixon dwelt at some length on the varied researches for which Berthelot was famous, referring more particularly to his work on the alcohols, and to his investigations on the acetylides of silver and copper and to his researches on explosions.

IN *Man* for November Messrs. J. L. Todd and G. B. Wolbach describe a series of stone circles in the Gambia. The type is in many respects analogous to those of Europe, and their object, judging from the remains discovered in the course of the excavations, was sepulchral. The Mandingo, who now occupy the region in which they are found, know little about them, and refer them vaguely to some tribe which preceded them. Their builders must have possessed more knowledge of stone-working than the Mandingos of the present day, and had considerable aptitude in lifting heavy weights. If the recent speculations of Prof. Elliot Smith be accepted, though they involve serious difficulties, the inspiration for the construction of these monuments came from the Egyptian stone-workers. The present Mandingos so far venerate these circles that they make war sacrifices near, or on, one of the stones, and bury spear-heads there. The excavations disclosed remains of weapons very like those used by the tribe at present. The facts, so far as they go, indicate that they were the work of a branch of the Mediterranean race, to which similar constructions in western Europe have, with some degree of plausibility, been attributed.

IN the first part of the Journal of the Royal Anthropological Institute for the current year Dr. H. J. Dunkinfield Astley discusses the well-worn subject of the origin and interpretation of the cup and ring markings which appear on stone monuments. Dismissing the numerous theories of previous inquirers, he suggests that they constitute the "heraldry of primitive man," being used, like the Churinga of the Australian Arunta, to define the exogamous groups. Before this explanation can be accepted more than one difficulty must be cleared up. We must be certain, in the first place, that the social organisation of the Arunta at the present day is comparable with that of the people who engraved these symbols on the monuments. Secondly, Dr. Frazer finds no proof of totemism or totemic clans in the races of western Europe, and it is unsatisfactory to assume that totemism is established by the existence of these symbols. Dr. Astley's paper is learned and interesting, but we fear that the secret of these markings must still remain a mystery.

IN her lecture "On the Marriage of First Cousins" (Eugenics Laboratory Lecture Series, No. iv.; London: Dulau and Co., 1911, pp. 39, price 1*s*. net), Miss E. M. Elderton presents the evidence for and against this type of matrimonial alliance in a clear and interesting manner. Consanguineous marriages have been objected to, and are objected to, on the ground that they result in (1) marked decrease in fertility; (2) high infantile mortality; (3) the occurrence of deaf-mutism, insanity, albinism, hare-lip, and other deformities with greater frequency among the offspring than among the general population. The conclusions arrived at may be broadly stated as follows:—(1) there is no evidence available to indicate whether the marriages of first cousins are more often absolutely sterile than those of persons unrelated to one another, but, omitting sterile marriages, the average number of children is approximately the same in both cases; (2) the statistics collected by Mr. Arner in America, and published in the year 1908, tend to show that among the issue of consanguineous marriages the death-rate of persons under twenty years old is considerably higher than the normal; (3) the evidence that the marriage of cousins is more likely to lead to albinism, deaf-mutism, and insanity among the offspring appears to be conclusive.

IN No. 42 of Scientific Memoirs by Officers of the Medical and Sanitary Departments of the Government of India, Major Rost and Captain Williams contribute the results of their own researches to the much discussed question of the cultivation of the leprosy bacillus. Although this organism has long been known and seen in the tissues of lepers, all attempts to grow it had until recently proved unsuccessful; and even now considerable scepticism is felt as to the identity of the bacteria isolated with the actual causal agent of the disease. The authors describe the organism which they obtained from cases of leprosy, and the effect produced on patients by vaccines prepared from it. In No. 41 of the same Scientific Memoirs Captain MacGilchrist considers, as the basis of original experimental work, the suitability of different preparations of quinine in medical practice. Attention is paid, in the main, to the solubility and absorbability of the different salts, and the various modes of administering them.

THE thirtieth Bulletin of the Sleeping Sickness Bureau contains an account of the intracellular phase of the rat-trypanosome, *Trypanosoma lewisi*, in its development in the rat-flea, recently discovered by Minchin and Thomson. This phase was found in fleas from twelve to thirty-six hours after they had fed on the blood of an infected rat, and appears to represent the first stage in the developmental cycle of the trypanosome in the flea. The trypanosomes penetrate into epithelial cells of the flea's stomach, grow very large, and divide into a number of trypanosomes of normal size. The daughter trypanosomes are usually eight in number. They are formed by division of the parent body within its own periplast; the flagellum of the parent is retained and moves actively until nearly the last moment, when it disappears, and the body becomes spherical and tense, and bursts suddenly, setting free the daughter trypanosomes in the cytoplasm of the host-cell, whence they find their way out singly into the lumen of the stomach.

CERTAIN small aurochs' skulls from the diluvial deposits of Belgium are described by Mr. R. v. d. Malsburg as a so-called new species, under the name of *Bos* (*urus*) *minutus*, in Bull. Internat. Ac. Cracovie, 1911, No. 5. Unless, however, the term *urus* be used in a generic sense, it would seem that a subspecies is intended. Under various forms, the author considers this *Bos minutus* to be the connecting link between the typical aurochs (which is regarded as the descendant of the Indian *B. namadicus*) and modern cattle.

WE have to acknowledge the receipt of a copy of a catalogue of the exhibits in the British section of the International Shooting and Field Sports Exhibition, held at Vienna last year. The British section, it will be remembered, was in the hands of the Government, and the catalogue is therefore issued—after the usual delay—by the official publisher. The book is well got up and well illustrated, and the section on big game—which forms the bulk—will possess a permanent value as the first attempt (unfortunately incomplete) at a list of the big-game fauna of the British Empire.

IN the Annals of the Transvaal Museum for July, 1911, Mr. J. Hewitt produces evidence to show that the maxillary bone of the viperine skull is more probably derived from the corresponding element of the proteroglyphous than of the opisthoglyphous section of colubrine snakes; in other words, that the Proteroglypha, rather than the Opisthoglypha (to which that position is assigned in the British Museum Catalogue of Snakes), have the stronger claim to be regarded as the ancestral stock of the vipers. The evidence derived from snake-venom seems to lend support to this view. In a second article (in Dutch), Dr. E. C. N. Hoepen describes a new generic and specific type of stegocephalian from the presumably Permian strata of Senekal, Orange River Colony, under the name of *Myriodon senekalensis*.

To *Naturwissenschaftliche Wochenschrift* for November 5 Dr. Otto Wilckens contributes an article on the extinction of animal groups during geological history, in which special attention is directed to ammonites, dinosaurs, and trilobites. Whether these groups—like the ammonites at the close of the Cretaceous—became completely wiped out by some general cause (*e.g.* over-specialisation), or whether, as Dr. Steinmann believes, they developed into new forms, is a question which is argued at some length. In the case of the ammonites the author is apparently inclined to favour the view that they may have become modified into Argonauta and the other octopods, although he rejects Steinmann's theory that dinosaurs developed into great flightless birds, that were exterminated by men, or that the "enaliosaurians" gave rise to whales and dolphins and pterodactyles to bats.

To *The American Naturalist* for November Mr. H. A. Allard contributes the second part of his account of the behaviour of bees when visiting the blossoms of cotton-plants. These bees were, of course, usually in the habit of visiting the ordinary American cottons, the flowers of these being furnished with certain nectaries which are absent in Asiatic cottons. When the insects came to fields where American and Asiatic cottons were growing side by side, they visited both indiscriminately, but when they alighted on Asiatic flowers they quickly perceived their error, and departed. "These visits of the bees to the outer basal portion of the Asiatic cotton-blossoms indicate that the visual powers alone were employed throughout the process." On the other hand, it is considered probable that bees ascertain the whereabouts of cotton fields by their sense of smell, a large area of cotton in flower giving off a distinct odour on a fine day.

THE Tertiary giraffes of India form the subject of a monograph by Mr. Guy Pilgrim, published in the *Palaeontologia Indica* (new series, vol. iv., No. 1). Years ago Mr. Lydekker, in face of the opposition of the late Prof. Rütimeyer, asserted that Sivatherium and its allies were undoubtedly giraffoids. Now that his views are definitely accepted, the list of Siwalik representatives of the group is a long one; and Mr. Pilgrim has done well in bringing the available information up to date. Following the modern fashion, he divides the Siwalik species into brachycephalic and dolichocephalic types; and he has likewise been enabled to throw considerable light on the respective geological horizons of the various forms. The most generalised Siwalik representatives of the group are described by the author under the name Progiraffa, but as one of them was, for a time, called Propalæomeryx by Mr. Lydekker, the latter designation is clearly entitled to stand. Whether it be in error or by design that some of the lower jaws are figured with the teeth pointing downwards, the effect is decidedly bad.

THE identification of the mosses collected on the Scottish Antarctic expedition having been entrusted to M. Jules Cardot, his report, received in separate form, is published in the Transactions of the Royal Society of Edinburgh (vol. xlviii., part i.). The chief collection, from Gough Island, yielded twenty-one species, of which eleven are endemic; the solitary bog moss, *Shagnum scotiae*, is a new species, but represented also on the island of Ascension. Only two of the species are recorded from Tristan d'Acunha, and, although more common species may be expected, the author finds a closer affinity with the moss vegetation of the Magellan region. The new species from Gough Island and Ascension are described and illustrated.

The October number of *Tropical Life* contains instructive articles on various economic products. In connection with the cultivation of the coco-nut palm, attention is directed to the fine grade of coco-nuts shipped from San San Blas, on the Panama coast, to the New York market, and to a cultivator suitable for removing strong-growing weeds from plantations. A discussion of the value of Nipa palms for the production of sugar and alcohol is based on the recommendations of Dr. H. D. Gibbs, of Manila, who affirms that an area of 100 hectares would supply sufficient raw material to keep a sugar-mill in continuous operation. Statistics relative to soya-bean cultivation in Portuguese East Africa are quoted, according to which a harvest varying from 25 to 40 bushels of seed per acre is obtainable; the yield of oil averages about 17 per cent. of the seed.

A *résumé* of recent researches into the nature of "graft-hybrids," culminating in the periclinal and sectorial chimæras obtained by Prof. H. Winkler and E. Heuer, is contributed by Dr. H. Fischer to *Naturwissenschaftliche Wochenschrift* (September 24). A description is given of the five composite types produced from grafts of the tomato and common nightshade by making an incision and so developing a new shoot from the point of union of scion and stock; and an illustration is supplied of the most complex combination, where the different branches represent the species *nigrum*, *Lycopersicum*, *Koelreuterianum*, *Gaertnerianum*, and *tubingense*. It is also explained how the solution was evolved by Dr. E. Baur from a study of the arrangement of coloured and colourless areas in the leaves of zonal pelargoniums. In both phenomena there is a mere juxtaposition of tissues derived from two original types, so that the term "graft-hybrid" proves to be a misnomer, and chimæra is accurately applied.

PROF. TITO ALIPPI has recently made a further contribution to our knowledge of the mysterious sounds known in different parts of the world as mist-poeffeurs, marinas, Barisâl guns, &c., and for which he proposes the name of *brontides* (*Boll. della Soc. Sismol. Ital.*, vol. xv., pp. 65–77). The new observations which he has collected come chiefly from the district surrounding Urbino and Rimini, in the north-east of Italy. The phenomena observed in this district follow the same laws as in other parts of Italy. They are well known in some localities and almost unknown in others not far distant. The detonations are usually described as resembling peals of thunder. They are heard most frequently in summer, with a clear sky and calm air, and generally occur in groups, and seem to come from the south-west. They do not appear to have any relation with local earthquakes, and are generally regarded by their observers as presaging bad weather, and especially snow in winter. From inquiries made elsewhere, Prof. Alippi concludes that brontides are practically absent from Sardinia and are almost quite unknown in all the western Alps.

So long as the bench-marks of the levelling system of this country are indicated by so crude a mark as the broad-arrow chiselled in masonry, or even cut upon wood, they do not respond to the needs of modern precise levelling, and small changes in such marks are not to be accurately determined. But in view of the probable relevelling of the main lines, and the employment of hemispherical-headed bolts for the principal points, the experience of the stability of bench-marks at Hamburg is of interest. There during the last twenty-five years the precise levelling has been checked from time to time, and a record of the change in level of bench-marks has been kept, the results of which are given in the *Zeitschrift für Vermessungswesen* for March 11. The bench-marks are partly on high, dry ground, and partly on moist ground which is more or less affected by the rise and fall of the tide; they are also classed as on buildings, on bridges, walls, and such masonry constructions, or on stone pillars founded on a concrete block. Of the 315 marks on the dry ground, of which 301 were on buildings, 76 have shown no settlement in twenty-five years, 118 have settled from 1 to 5 mm., 68 from 6 to 10 mm., and 53 from 1 to 4 cm. In moist ground, where 399 out of 552 marks were on buildings, 291 had settled more than 1 cm., the maximum case being 21 cm.; and of these 243 were on buildings, so that under such conditions marks on separate masonry pillars or small masonry works were less affected.

THE U.S. Weather Bureau has sent us copies of its meteorological charts of the great oceans for December. In addition to the usual data which occupy the face of the charts, the reverse sides include articles on the average air and sea temperatures for that month, illustrated by special charts. Prof. McAdie supplies some interesting details relating to the steps taken for obtaining wireless telegrams from vessels in the North Pacific, and for supplying vessels with a synopsis of weather conditions and forecasts. Cablegrams are received from Honolulu, Manila, Shanghai, and Nemuro (Japan), and, through the courtesy of the "Western Wireless Press Association," wireless messages will be sent broadcast from San Francisco daily for the benefit of vessels on the Pacific. Thus what has been accomplished on the Atlantic, as regards radio-telegraphy, seems likely to be realised shortly on the Pacific also.

AN important investigation by Dr. Hugo Karsten relating to the state of the ice in the Gulf of Finland and the northern part of the Baltic forms the sixth part of *Finnländische hydrographisch-biologische Untersuchungen*. It comprises observations made during the winters of 1897–1902, with ice-charts for each year, showing by different tints the conditions at three or four different times during the season. The state of the ice naturally differs considerably in time and space in different years, but at present there is no general and theoretical discussion of the data. This is promised with the next volume, which is to appear shortly, and will, we feel sure, be a very useful addition to our knowledge of oceanography.

IN further support of his theory of the existence in the electric discharge through vacuum tubes of "magnetic rays" made up of doublets formed by the combination of a negative electron with a positive ion, Prof. Righi describes two new experiments in the *Rendiconti* of the Academy Lincei, part iv., and in *Le Radium* for October. The first consists in bringing a bulb, in which an electrodeless discharge is being produced by an oscillating discharge through a flat coil outside it, into the magnetic field of a coil through which a direct current is flowing. The luminous ring stretches out towards the coil and becomes bell-shaped. In the second experiment canal rays are produced behind a kathode of considerable thickness placed obliquely to the axis of the tube and pierced by a small hole at right angles to its surfaces. The canal rays are received on a plate which is connected to a galvanometer. When a magnetic field parallel to the axis of the tube is established, the "magnetic rays" produced fall on a second plate, which can also be connected to the galvanometer. This plate is found to receive no current whatever from the magnetic field, but the first plate receives a positive current, which decreases as the magnetic field increases.

In laboratories remote from large towns, the absence of a gas supply is the cause of much difficulty; and this applies to chemical, physical, bacteriological, agricultural, and metallurgical laboratory work. Carburetted water gas has been used in some cases, but has been shown to be attended with some drawbacks. We have received a pamphlet from Messrs. Mansfield and Sons, of Birkenhead, describing their oil-gas apparatus for laboratories. For the gas plant great durability and simplicity is claimed. Any kind of oil (mineral, animal, or vegetable) can be used for cracking, and no skilled labour is necessary, since putting a shovelful of coal on the fire every twenty or thirty minutes, and seeing that the oil is flowing in, is all the attendance required. The oil gas produced is permanent, has a very high calorific value, and requires no purification before use. This gas can be used in ordinary burners and appliances for laboratory use, provided that the gas jet is reduced in size to correspond with the higher carbon contents of the gas. Particulars are given in the same list of Bunsen burners, furnaces, drying and sterilising ovens, blow-pipes, and water heaters modified to burn oil gas.

The memorandum of the Manchester Steam Users' Association for the year 1910 contains some interesting investigations by their chief engineer, Mr. C. E. Stromeyer, on the trustworthiness of mild steel. Some of the results have been presented at the Iron and Steel Institute; and in the present paper Mr. Stromeyer gives subsequent data confirming the view that the presence of nitrogen gives a bad steel likely to crack in undergoing the necessary workshop processes or in subsequent working of the boiler of which it forms a part. The evidence points to the fact that steels in which the percentage of phosphorus added to five times the percentage of nitrogen exceeds 0·08 will be untrustworthy in working. The author has tried many mechanical tests with the view of discovering one which would differentiate between trustworthy and untrustworthy steels, but without success. Except as regards bad heat treatment, chemical determinations, more particularly of phosphorus and nitrogen, are the only available guides when the process of manufacture and the composition of the raw material are not known. Engineers, however, are not likely to place overmuch confidence in a test which they cannot check, and will prefer to continue to rely on the reputations of the manufacturers, combined with a few mechanical tests.

The third part of the work known as "Harmsworth Popular Science," edited by Mr. Arthur Mee, which is appearing in fortnightly sevenpenny volumes, has been received. In it the story of the evolution of the earth as the abode of plant and mineral life, the appearance of man and his gradual development, and his subsequent conquest of nature and the organisation of human society, is continued in the same popular manner as in previous issues. The work is profusely and excellently illustrated, and the account it provides of the triumphs of science will serve to encourage among ordinary readers an appreciation of the extent to which human progress is indebted to the labours of men of science.

OUR ASTRONOMICAL COLUMN.

Astronomical Occurrences for December:—

Dec. 3. 19h. 39m. Saturn in conjunction with the Moon (Saturn 4° 5′ S.).
4. 15h. 55m. Mars in conjunction with the Moon (Mars 0° 50′ S.).
6. 22h. 0m. Mercury in conjunction with Lambda Sagittarii (Mercury 0° 1′ S.).
7. 7h. 0m. Mercury at greatest elongation E. of the Sun.
10. 23h. 0m. Vesta in conjunction with the Moon (Vesta 0° 28′ S.).
15. 15h. 0m. Mercury stationary.
16. 2h. 58m. Venus in conjunction with the Moon (Venus 3° 39′ N.).
22. 10h. 54m. Sun enters sign of Capricorn. Solstice.
,, 14h. 43m. Uranus in conjunction with the Moon (Uranus 4° 36′ N.).
25. 4h. 0m. Mercury in inferior conjunction with the Sun.
29. 9h. 0m. Mars stationary.
31. 3h. 59m. Saturn in conjunction with the Moon (Saturn 4° 1′ S.).
,, 20h. 10m. Mars in conjunction with the Moon (Mars 0° 1′ S.).

Observations of Mars.—Nos. 4537–8 of the *Astronomische Nachrichten* contain several important records of recent observations of Mars. Under date November 21 Prof. Lowell telegraphs: "First morning frost Mars observed since November 3, 30° from S. pole on sunrise limb."

M. Antoniadi reports an encroachment of Syrtis Major, since 1909, on the W.S.W. of Libya to the extent of about 100 km., and several other changes. The chief interest of the observations appears to be in the apparent variations wrought by changes in the Martian atmosphere. M. Antoniadi suggests that, with these eliminated, the actual changes in the majority of the small details of the planet's surface would be very few. The intrinsic colour of such "*îles*" as Argyre 1, Noachis and Hellas, it is deduced, is red, and their apparent bronze hues are produced by the passage of yellow cloud screens.

M. Comas Sola records observations made at the Fabra Observatory, Barcelona, during October 9–16. A new canal was seen on October 9 to the east of Syrtis Major; it appeared to correspond to a prolongation of Nubis, which, passing L. Mœris, extended as an arc towards Triton. The whole region of Isis and Libya was covered by an immense, oval, brilliant cloud on October 11, the new canal being completely hidden in parts; this veil afterwards moved away at about 30 km. per hour. M. Comas Sola tentatively suggests that volcanic action on Mars would account for the production of these massive veiling clouds.

Important changes are also reported by the Jarry-Desloges observatories at Massegros and Sétif. Nepenthes and Nilosyrtis are said to be enormous, and Ausonia and Hesperia greatly changed; early in November the diameter of the south polar spot was 1·2″.

Are the White Nebulæ Galaxies?—This question is attacked from several directions by Prof. F. W. Very in No. 4536 of the *Astronomische Nachrichten*, and the discussion of the various points is exceedingly interesting. Considering the relative brightness of nebulæ of different diameters, he arrives, first, at the conclusion that the light from these extra-galactic bodies does suffer absorption in interstellar space, and therefore one of the great objections to an infinitely extended universe, the apparent darkness of the sky, is explained. Then the apparent sizes and brightnesses of these bodies are compared with those of other celestial bodies of which the distances are approximately known. This leads to results as to the intrinsic brightness of the white nebulæ, hence to the question of their star-density, and, finally, it is found that these celestial objects are probably galaxies. Their diameters appear to differ to at least a fourfold extent, and the dimensions and brightness of the component stars are closely allied to those obtaining in our own stellar system. Of course many assumptions are necessary in such a discussion; but it is